

Abstract

Apparatus and methods are disclosed for filtering and entrapping debris from the vascular system of a patient. Apparatus is disclosed for filtering and entrapping debris from the vascular system of a patient comprising: a filter device being sized to allow blood flow therethrough and to restrict passage of debris therethrough, and the filter device having a first given perimeter, a proximal side and a distal side; and wherein the filtering device captures debris carried in a first direction of blood flow from the proximal side to the distal side thereof on the proximal side of the filter device; an entrapment mechanism having a proximal side and a distal side, the entrapment mechanism including a selective opening to allow passage of debris and blood therethrough, the selective opening being configured to allow passage of blood and debris carried therein therethrough in the first direction of blood flow from the proximal side to the distal side of the entrapment mechanism, the selective opening having a restriction mechanism to prevent debris passage from the distal side to the proximal

side of the entrapment mechanism in a second direction opposite to the first direction, the selective opening forming a second given perimeter, and the first given perimeter and the second given perimeter being deployed within the vascular system so as to form a chamber between the distal side of the entrapment mechanism and the proximal side of the filtering device; wherein the entrapment mechanism allows blood and debris carried therein therethrough in the first direction of blood flow, the filtering device allows blood therethrough in the first direction of blood flow, and the restriction mechanism prevents debris back through the selective opening in the second direction of blood flow opposite to the first direction of blood flow such that the chamber entraps the filtered debris received therein for debris removal from the vascular system of the patient. A method is disclosed for filtering and entrapping debris from the vascular system of a patient, said method comprising: providing apparatus for filtering and entrapping debris from the vascular system of a patient, said apparatus comprising: a filter device being sized to allow blood flow

therethrough and to restrict passage of debris therethrough, and said filter device having a first given perimeter, a proximal side and a distal side; and wherein said filtering device captures debris carried in a first direction of blood flow from said proximal side to said distal side thereof on said proximal side of said filter device; an entrapment mechanism having a proximal side and a distal side, said entrapment mechanism including a selective opening to allow passage of blood and debris therethrough, said selective opening being configured to allow passage of blood and debris carried therein therethrough in said first direction of blood flow from said proximal side to said distal side of said entrapment mechanism, said selective opening having a restriction mechanism to prevent debris passage from said distal side to said proximal side of said entrapment mechanism in a second direction opposite to said first direction, said selective opening forming a second given perimeter, and said first given perimeter and said second given perimeter being deployed within the vascular system so as to form a chamber between said distal side of said

entrapment mechanism and said proximal side of said filtering device; wherein said entrapment mechanism allows blood and debris carried therein therethrough in said first direction of blood flow, said filtering device allows blood therethrough in said first direction of blood flow, and said restriction mechanism prevents debris back through said selective opening in said second direction of blood flow opposite to said first direction of blood flow such that said chamber entraps the filtered debris received therein for debris removal from the vascular system of the patient; inserting said apparatus into the vascular system of the patient; allowing blood and debris carried therein to flow through said entrapment mechanism, and into said chamber; and removing said apparatus from the vascular system of the patient.